

ERV

Energy Recovery Ventilators

Installation, Operation and Maintenance Instructions Manual



Capacity: 400 to 600 cfm
Model: ERV500i/e



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Manufacturer reserves the right to discontinue or change specifications or designs without notice or obligation.

Nomenclature

ERV500i Nomenclature (400–700 cfm)

[illegible]

Notes:

- 1 When ordering recirc defrost, you must order an outside air damper. Recirc defrost option includes recirculation dry contacts for unoccupied mode.
- 2 Outside air damper required.
- 3 Units ordered with the wheel rotation sensor option must include a frost control option other than 'N'.
- 4 Non-fused disconnect switch is field installed.



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ERV500e Nomenclature (400–700 cfm)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. FROST CONTROL E – Exhaust only ¹ C – Non-defrost N – Non-defrost, no wall control compatibility 2. VOLTAGE/SPEED B – 208–120/1/60 - one-speed ² C – 230–120/1/60 - one-speed ² 3. INTERNAL PROTECTION 1 – 1" insulation, single wall 2 – 1" insulation, double wall 4. SENSOR CONTACTS W – Wheel rotation sensor ³ X – No contacts, no sensor 5. EXTERNAL FINISH G – Grey prepaint package 6. OUTSIDE AIR DAMPER 1 – Non-insulated motorized 2 – Insulated motorized 3 – Insulated spring return 4 – No damper 7. EXHAUST AIR DAMPER 1 – Backdraft (low leak) 2 – Non insulated motorized (low leak) 3 – Insulated motorized (low leak) 4 – No damper														
14. ENERGY RECOVERY 1 – Aluminum wheel, no purge 13. FREE COOLING S – Setpoint enthalpy controller D – Differential enthalpy controller T – Thermostat (dry bulb) X – No free cooling controller 12. FILTRATION S – Supply filter E – Exhaust filter B – Supply and exhaust filters X – No filtration 11. RETURN AIR B – Bottom return air S – Side return air 10. SUPPLY DISCHARGE D – Down supply discharge E – End supply discharge 9. HOODS H – Intake/exhaust hoods X – No hoods ⁵ 8. EXTERNAL DISCONNECT N – Non fused disconnect switch ⁴ X – No disconnect switch														

- Notes:**
- 1 Outside air damper required.
 - 2 Requires a neutral wire with L1 and L2.
 - 3 Units ordered with the wheel rotation sensor option must include a frost control option other than 'N'.
 - 4 Non fused disconnect switch is field installed.
 - 5 Must order hoods when ordering dampers.

Safety Considerations

Warning, Caution and Important notes appear throughout this manual in specific and appropriate locations to alert Installing Contractors and maintenance or service personnel of potential safety hazards, possible equipment damage or to alert personnel of special procedures or instructions that must be followed as outlined below.

⚠ WARNING

Identifies an instruction which, if not followed, might cause serious personal injuries including possibility of death.

CAUTION

Identifies an instruction which, if not followed, might severely damage the unit, its components, the assembly or final installation.

IMPORTANT

Indicates supplementary information needed to fully complete an instruction or installation.

Hazards may exist within this equipment because it contains electrical and powerful moving components. Only qualified service personnel should install or service this equipment. Untrained personnel can perform basic maintenance such as maintaining filters. Observe precautions marked in literature and on labels attached to the unit. Follow all safety codes.

⚠ WARNING

Disconnect the main power switches to the unit before performing service or maintenance. Electric shock can cause personal injury or death.

General Information

The ERV500i ventilator is intended for installation within a suspended ceiling space or mechanical room. The ERV500e ventilator is intended for installation on a rooftop with a factory supplied or field supplied roofcurb.

These ventilators provide 100% outdoor air ventilation and provide energy recovery between the exhaust and

supply airstreams. The Energy Recovery Ventilators (ERVs) use an enthalpy wheel for total energy recovery which provides superior efficiency in hot and humid climates. In addition, they provide excellent heat recovery in winter and transfer moisture from exhausted air to the outdoor air before supplying it to an occupied space.

Installation

Check Equipment

Move the unit to its installation location and remove packaging. See [Appendix F](#) for unit weight and specifications.

Inspect the exterior and interior of the equipment for damage. Ensure there is no damage to internal components such as fans, motors, dampers, enthalpy wheel, insulation, etc. File a claim with the shipping company if the unit is damaged.

System Requirements

Consult local building codes and the National Electrical Code for special installation requirements. Note additional requirements below and in the [Start-up](#) section.

Mount Unit

Interior Mount

The unit should be installed to allow easy access for maintenance. [Appendix B](#) shows minimum clearance required between front access and any obstruction to allow for removal of components (fans, filters, enthalpy wheel). The

front of the unit is defined in relation to the inlet ports and outlet ports on the unit. Port location and overall dimensions are shown in [Appendix B](#). Unit components are shown in [Appendix E](#).

In cold climates (–5°F [–20°C] design), the unit must be mounted in a dry area (not exceeding 30% RH) to avoid condensation on the exterior of the cabinet during winter operation. Alternatively, accommodation must be made for condensation on the cabinet exterior. Do not mount units in an area where exposure to hot chimneys, electrical panels or other hazards will occur.

A mounting location close to an exterior partition will minimize the length of insulated ductwork required. Exhaust air to outside and inside air ducts must be insulated. Inlet and exhaust hoods should be separated by a minimum of 10 feet [3,048 mm] to avoid outside cross contamination.

Ceiling Mount

The unit must be mounted level and may be hung with threaded rod (field supplied) through the protruding frame at the base of the unit. Hole centers are shown in the overall dimensional drawings in [Appendix B](#). Rubber or seismic vibration isolation may be required in some regions (field supplied and specified).

Surface Mount

The unit may be secured to a metal or wooden curb fastened to the floor. If securing the unit to the curb is required, fasteners and isolators may be used at the mounting points on the frame protruding from the unit (all mounting hardware is field supplied and specified).

Rooftop Mount (ERV500e Only)

Care must be exercised in locating the roofcurb for the unit on the roof opening. The HVAC system should cross enough roof supports to safely distribute the weight of the system over the roof. For hole sizes of the units, see [Appendix B](#). For more roofcurb information, see [Appendix A](#).

Remove roofcurb from packaging. Assemble and install accessory roofcurb in accordance with instructions shipped with the curb. See [Appendix A](#) for curb dimensions. Install cant strip, flashing and roof felt as per [Appendix A](#).

IMPORTANT

The gasketing of the unit to the roofcurb is critical for a water-tight seal. Install gasket with the roofcurb as shown in [Appendix A](#). Improperly applied gasket can result in water leaks and poor unit performance.

Ductwork must be attached to the roofcurb, not the unit. Consult with local authorities or your local building code for minimal intake hood height from the roof to determine the height of the roofcurb. See [Appendix B](#) for dimensions of the unit.

Make Duct Connections

ERV500i

Port locations for the indoor unit are labeled in Figure B1.

An 18" [457 mm] long section of straight duct must be used immediately after the supply fan to achieve optimal fan performance. Transitions (field supplied) may be required to make connection with ductwork that is properly sized for minimum noise and pressure loss. Both duct connections to outside must be insulated to avoid condensation and heat loss. A continuous integral vapor barrier must be used over the duct insulation.

Airflow rate balancing dampers are recommended for both supply and exhaust ducts to allow for adjustment of airflows as shown in Figure D1. Flexible connectors should be installed close to the unit in the duct leading to occupied spaces to minimize noise transmission. All ports have 1" [25 mm] flanges to facilitate duct connection. Ensure that fasteners used to make duct connection do not interfere with fans or dampers in the unit.

Electric preheat, if used as frost control, must be installed in the intake from outside at a minimum distance from the unit port of 24" [610 mm].

ERV500e

On vertical discharge units, secure all ducts to the roofcurb and building structure. Do not secure ductwork to the unit. For duct size requirements, see [Appendix B](#). Insulate and weatherproof all external ductwork, joints and roof openings with counter flashing and mastic in accordance with applicable codes. Ductwork running through roof decks must comply with local fire codes. Ducts passing through unconditioned spaces must be insulated and covered with a vapor barrier. Flexible connectors should be installed close to the unit in the duct leading to occupied spaces to minimize noise transmission.

Rigging and Placing the Unit (ERV500e only)

Inspect the exterior and interior of the equipment for damage. Ensure there is no damage to internal components such as fans, motors, dampers, enthalpy wheel, insulation and structures. File a claim with the shipping company if the unit is damaged.

IMPORTANT

The hoods for these units are not installed from the factory and must be installed on site. They can be installed prior to rigging the unit or after the unit is installed. Hoods are shipped on top of the unit. When rigging the unit, ensure that the hoods are secured and are not damaged by the spreader bars. See [Appendix C](#) for hood installation and rigging information.

CAUTION

All panels must be in place when rigging.

Spreader bars are required to prevent damage to the roof flange. Rollers may be used to move the unit across a roof. Lifting holes are provided in the base rails as shown in [Appendix C](#). For weights and overall dimensions, see Figure B2.

Location

Maintain clearance around and above the unit to provide proper airflow and service access. The fresh air intake hood must be positioned away from sources of contamination such as chimneys, exhaust vents, etc. Positioning the fresh air intake opposite to the prevailing winds will reduce entry of snow or moisture during periods of high winds.

Install Hoods (ERV500e only)

Intake and exhaust hoods for these models are shipped separately from the unit. See [Appendix C](#) for hood installation information. A quick connect for the damper motors is provided to connect to the main body of the unit. Make

sure that all screws are secured to maintain proper support and keep seals water-tight.

Install Access Panel Handles

IMPORTANT

Securing door fasteners too tightly has negative effects on the door gasket and should be avoided.

Handles for access panels are provided but must be installed on site. Handles and fasteners are secured on the top of the unit. Remove from packaging and install according to Figure 1.

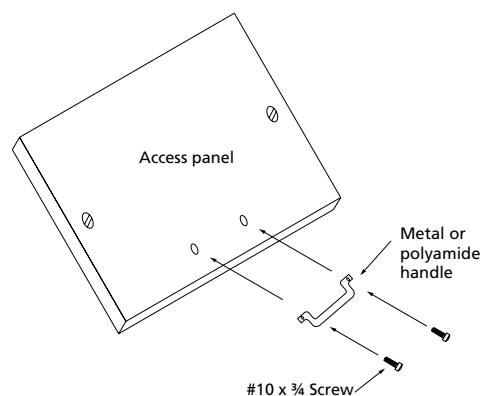


Figure 1: Access panel handles

Remove All Internal Packaging

CAUTION

Remove all ERV wheel packaging prior to start-up.

Remove access panels and remove all packaging from the unit. Note that there is packaging for the wheel support during shipping. Removal of all of this packaging is critical.

Systems Integration

Forced Air System

When the unit is installed in conjunction with a forced air system, the air handler and the network of ducts associated with it are used to distribute fresh air inside the building. If this type of system is used, the main fan of the air handler must operate continuously when the unit is on. Fan interlock can be connected in the unit control box to the integrated control board terminals J3-1 and J3-2. The controller makes relay contact between these terminals when the unit is operating, as shown in Figure 2.

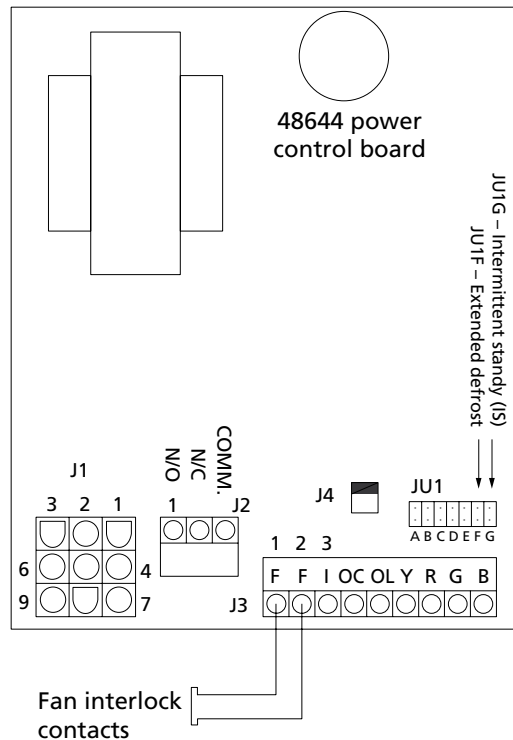


Figure 2: Fan interlock control board

Fresh air from the unit should be introduced into the return duct of the air handler at a point no less than 6 feet [1,829 mm] upstream of the air handler. The duct connection for stale air to the unit should be made on the return air duct at least 2 feet [610 mm] upstream of the fresh air duct connection.

Separate Systems

Select locations for exhaust grilles and supply diffusers to provide effective ventilation and avoid short circuiting airflows through the space. Adjustable dampers should be provided at every grille and diffuser to make balancing of the system possible.

Exterior Hoods

The outside air intake hood must be positioned away from sources of contamination. A screen with ¼" [6 mm] grid is recommended to prevent intake of debris and pests. The screen should be removable in cold climates where frost blockage may occur.

Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. Failure to follow this warning could result in the Installer being liable for personal injury of others.

Power Supply

These units may or may not have a factory installed disconnect switch. If disconnect is field supplied, provide a disconnect as per NEC. Use copper conductors only.

All field wiring must comply with NEC and local requirements. In Canada, electrical connections must be in accordance with CSA C22.1 Canadian Electrical Code Part One.

Table 1: ERV500 Power Supply

	ERV500i	ERV500e
Line voltage	120	230
MCA	9.4	11.1
MOP	10	15

Field Connection

A high voltage connection (shown in Figure 3) is located on the outside of the unit with knockout. A field installed

disconnect switch must use a liquid-tight connector between the disconnect switch and the outside panel of the unit eliminating any water penetration into the control box. A wiring diagram is located on the control box lid inside of the unit.

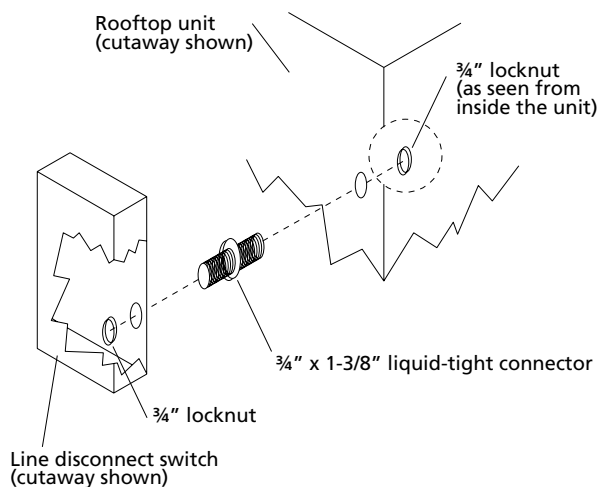


Figure 3: High voltage field connection

The low voltage connection runs through the roofcurb and roof opening to the bottom panel. Low voltage remote wiring terminal is located inside the unit on the control box. Installer must provide wiring for the controls that may be supplied optionally.

Start-up Controls

A low voltage remote control wiring interface is provided on the unit. The installer must provide wiring for the controls that may be supplied optionally. The optional wall controls require a four-wire LVT 24 gauge (or equivalent). This control is 12 VDC. Other terminals are 24 VAC or dry contact control. Terminals are available for the following controls:

- Low-Com-High
 - Makes dry contact for speed setting.
- Wall control
 - Four-wire LVT 24 gauge minimum (12 VDC).
- Occupied timer/sensor
 - Needs dry contact to operate. 24 VAC is required when timer is used. Do not use with Xtra wall control.
- Enthalpy control
 - 24 VAC.
- Remote fan control
 - Requires single pole, double throw switch.
- Low temperature control
 - Makes dry contact.
- Wheel rotation sensor

- Makes dry contact.
- CO₂ ventilation control
 - Makes dry contact.
- Unoccupied recirc contacts (ERV500i only)
 - 24 VAC.
- Smoke detector
 - Makes dry contact.

For more information on the controls available for the energy recovery ventilators, see the following [Appendix G](#) references:

- [Wall Control Connection](#)
- [Occupied Timer/sensor Connection](#)
- [Enthalpy Control](#)
- [Remote Fan Control](#)
- [Low Temperature Control](#)
- [Wheel Rotation Sensor](#)
- [CO₂ Ventilation Control](#)
- [Unoccupied Recirc Contacts \(ERV500i only\)](#)
- [Smoke Detector](#)

Frost Control

The unit functions are controlled by integrated unit controls including recirculation/exhaust only defrost (optional). In cold temperatures, frost control cycles will remove frost from the enthalpy wheel to maintain proper operation. This removal of frost occurs when a damper closes the outside air port and allows room air to circulate through the enthalpy wheel and back to the vented room. Each unit has different frost control requirements and the schedules are shown on the wiring diagrams located in the unit control box.

Exhaust Only

Supply fan is de-energized. There is no outdoor air ventilation for the duration of frost control. Enthalpy wheel maintains rotation.

Recirculation (ERV500i Only)

The exhaust fan is de-energized. There is no outdoor air ventilation for the duration of frost control. Enthalpy wheel continues to rotate.

Sequence of Operation

Before start-up, check the unit for obstructive packaging, objects near or in blowers, dampers, enthalpy wheel, etc. Once installation is complete, check all modes of operation to ensure that the unit is working properly. Close the doors and check for operation on Low and High using the dry contacts labeled Low-Com-High on the side of the unit. If there is a wall control, check the operation of all speed settings.

Units Equipped with Frost Control

When the unit is in defrost, unoccupied mode, or off, the ventilation damper will close. The ventilation damper will open during ventilation.

IMPORTANT

On initial power up, the unit will perform a system check and operate at high speed for five seconds.

Unit Checkpoints

- Power connected, no ventilation call – Both fans are off, frost control damper (if equipped) closes off fresh air from outside.
- Power connected, low speed call (if equipped) – Both fans on low speed, frost control damper (if equipped)

opens fresh air from outside and closes recirculation opening. If unit is single speed, it will come on that speed on a call for low or high.

- Power connected, high speed call – Both fans on high speed, frost control damper (if equipped) opens fresh air from outside and closes recirculation opening. If unit is single speed, it will come on the speed on a call for low or high.
- Power connected, occupied timer/sensor connection open (unoccupied mode) – Both fans are off, frost control damper (if equipped) closed off fresh air from outside.
- Power connected, enthalpy control contacts closed, unit ventilating – Wheel stops rotating, fans stay on set speed, frost control damper (if equipped) is open.
- Power connected, enthalpy control contacts closed, unit not in ventilation mode – Wheel does not rotate, fans come on low speed (if equipped), if unit is single speed, it will come on that speed on a call for low or high, frost control damper (if equipped) is open.
- Power connected, recirculation defrost (optional) is factory installed – Recirc contacts are closed, exhaust fan is de-energized, supply fan runs and recirculation damper opens (ERV500i only).

Airflow Balancing

For proper performance the unit must operate with equal supply and exhaust flow rates. Permanent or temporarily field supplied and installed flow measuring stations (FMS) and magnehelic gauges can be used to measure and compare supply flow with exhaust flow. [Appendix D](#) shows proper installation of the FMS in the “exhaust air from space” and “supply air to space” ducts for measuring exhaust and supply flows respectively.

It is important to locate the FMS in the “warm side” ductwork as described above to minimize the effect of dif-

ferences in air density, especially when balancing during extreme cold outside conditions. Air density variations can effect the FMS by more than 15%.

The FMS should be located downstream from straight sections of duct and not immediately after fans or obstructions that will cause turbulent flow. See [Appendix D](#) which illustrates minimum distances from fan, elbows or transitions for best operation.

Flow control dampers should be installed downstream from the FMS so flow through the FMS is not disturbed. Dampers can then be adjusted to equalize flow rates in the ducts.

Setting Flow Rate

Flow rates should be balanced with units operating on high speed. A damper must be used to establish the minimum duct pressure required so fans do not operate in overload regions. Set the dampers to establish the minimum duct pressure required. Further adjust the dampers to reduce flow to the desired, balanced rate.

Airflow performance can be measured using flow measuring stations (FMS) as described above or performing air flow measurements using ASHRAE suggested methods.

Where space is limited in the outdoor air or exhaust air ducts, pressure drop readings can be taken across the enthalpy wheel rotor and extrapolated from Table 2. Heat recovery performance is tested in accordance to AHRI Standard 1060 and is accurate to within $\pm 5\%$ if there is no dirt buildup in the heat recovery wheel.

Table 2: ERV500i/e Enthalpy Wheel Airflow vs. Velocity and Pressure Drop

Airflow (cfm)	Velocity (fpm)	Pressure Drop (in. w.g.)
300	417	0.45
400	556	0.60
500	695	0.76
600	834	0.93
700	973	1.10

System Service Quarterly Maintenance

⚠ WARNING

Disconnect the main power switch to the unit before performing service and maintenance procedures.

Quarterly maintenance (every three months) should include:

Air Filters

The standard medium efficiency filters are disposable and should be replaced every three months. More frequent re-

placement may be required under extremely dirty operating conditions. For filter specifications, see [Appendix F](#).

Cassette Panels and Interior of Unit

The foil faced insulation surfaces and cassette panels should be wiped clean with a soft cloth and mild cleaning solution.

Annual Maintenance

Annual maintenance should include:

Air Filters

Replace medium efficiency filters.

Interior of Unit

Wash the foil faced insulation surfaces with a soft cloth and mild cleaning solution.

Enthalpy Wheel

No cleaning of the enthalpy wheel is required, it is self-cleaning due to the opposing airflows. If the enthalpy wheel needs to be cleaned, use low pressure air or a vacuum. Wash the cassette panels with a soft cloth and mild cleaning solution. Visually inspect the cassette brush seals (shown in Figure 4), perimeter seal and drive belt for proper operation.

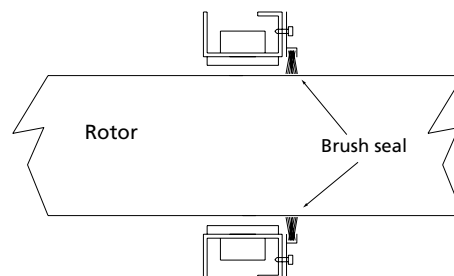


Figure 4: Brush seal

Fans

The blower wheels and fan housing should be checked for dirt build-up. If they are dirty, it will be necessary to remove the blower assembly to clean the dust out through the fan mouth.

System Operation Check

Verification of all control modes should be checked to ensure proper operation. Refer to [Start-up](#) Section.

Testing and Replacement of the Damper Actuator

⚠ WARNING

Disconnect the main power switch to the unit before performing service and maintenance procedures.

After disconnecting the power from the unit, determine if the actuator is defective. Disconnect the 24V power source. Connect the actuator directly to a 24V power source with an appropriate cable. If the damper operates

correctly, the problem is either in the wiring connections or main circuit board.

If the actuator does not work, it must be replaced. Loosen the nuts on the jack shaft clamp, remove the actuator. Tighten the clamp on the damper jack shaft. Test for proper operation.

Motor and Blower Removal

Exhaust

After disconnecting the power from the unit, disconnect all the plug-in connectors on the left side of the control box.



Figure 5: Disconnect plug-in connectors

Remove the four Phillips head screws holding the control box cover. Using a ¼" nut driver, remove the four hex head screws holding the control box to the unit. Remove the control box to gain access to the exhaust blower assembly.



Figure 6: Remove control box cover

To remove the exhaust blower, unscrew the two wing nuts used to fasten the blower assembly to the middle shelf in the unit. Rotate the blower assembly and slide it out of the unit.

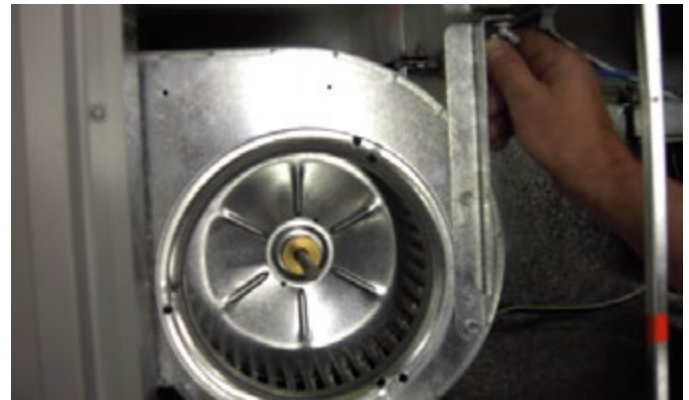


Figure 7: Remove exhaust blower

Supply

After disconnecting the power from the unit, disconnect the three-wire connector between the supply motor and control box.

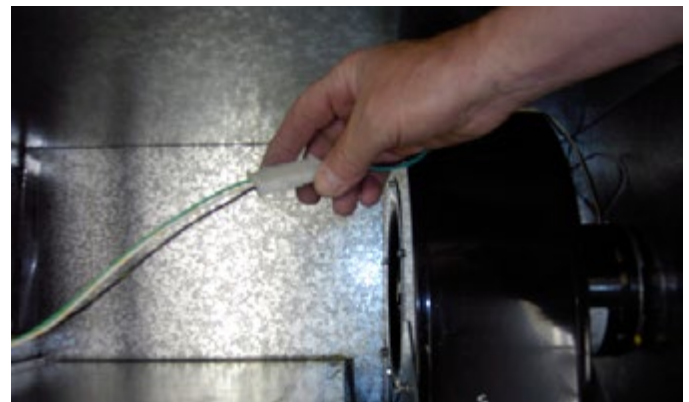


Figure 8: Disconnect three-wire connector

⚠ WARNING

Disconnect the main power switch to the unit before performing service and maintenance procedures.

To remove the supply blower, unscrew the four wing nuts used to fasten the blower assembly to the middle shelf of the unit. Slide the blower assembly out of the unit.

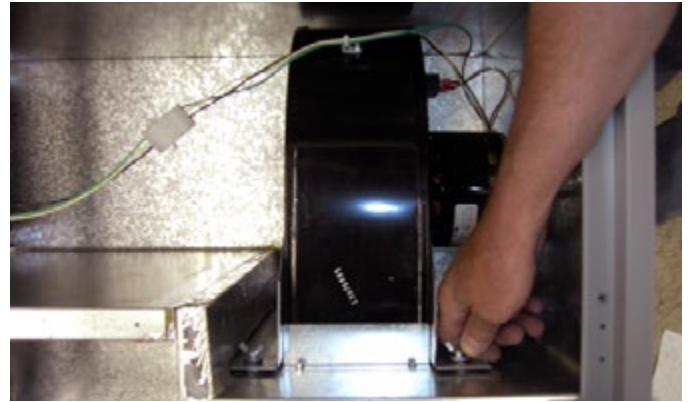


Figure 9: Remove supply blower

Cassette Removal

After disconnecting the power from the unit, disconnect the two three-wire connectors located on the metal frame of the cassette assembly. Both connectors are positioned at the front of the cassette assembly, one connector located at the top right position and the other at the bottom left position on the cassette frame. Disconnect the three-wire connector from the control box being used to supply power to the cassette motor.

IMPORTANT

Use extreme care when removing or installing the cassette assembly. Damage to the cassette media may result in poor unit efficiency and may void the warranty.

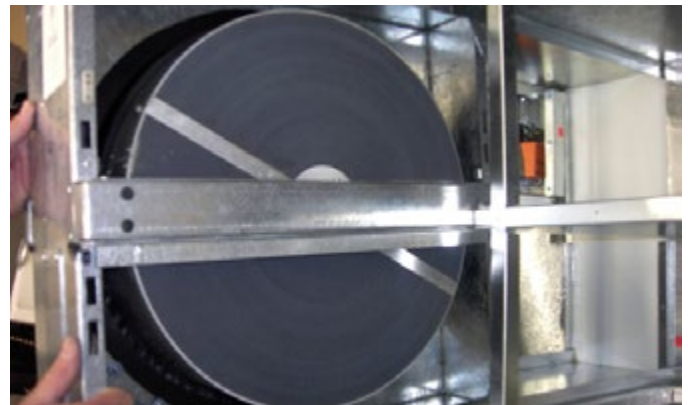


Figure 10: Remove cassette assembly

Cassette Service

Brush Seal

Complete the following instructions to replace the brush seal on both sides of the cassette. On the belt side of the cassette, remove the two Phillips screws holding the air filter guide to the cassette assembly. Remove the additional Phillips screw holding the brush seal to the cassette assembly. On the motor side of the cassette, remove the three Phillips screws holding the brush seal to the cassette assembly.



Figure 11: Remove screws holding brush seal to cassette assembly

WARNING

Disconnect the main power switch to the unit before performing service and maintenance procedures.

Install the new brush seals so that the bristles come in contact with the cassette. Reverse the procedures above to re-install the brush seals and the air filter guide.

Drive Belt

To replace the cassette drive belt, the brush seal located on the drive belt side of the cassette must be removed. Complete the steps in the previous section for the removal of the brush seal prior to completing the following procedures.

The cassette beam assembly must be removed to gain access to the cassette drive belt. To remove the cassette beam assembly, remove the three Phillips screws used to fasten the cassette beam cover.



Figure 12: Remove cassette beam assembly

Using a 1/8" Allen key, loosen the two set screws used to tighten the cassette bearing to the cassette shaft. The set screws are located in-line with the cassette shaft, between the cassette and the cassette beam. After loosening one set screw, it will be necessary to rotate the wheel a half turn to access the second set screw.



Figure 13: Loosen set screws

Using a 7/16" nut driver, remove the four 1/4" bolts holding the cassette beam to the cassette frame. The cassette beam can now be removed and placed aside to re-install later.



Figure 14: Remove cassette beam bolts

Remove the outer half of the adjustable sheave (pulley). Using a 5/32" Allen key, loosen the set screw located on the outer half of the adjustable sheave. Remove the outer half of the adjustable sheave by turning it counter-clockwise. This sheave piece is threaded and therefore it will take a few rotations to completely remove it. Once removed, slide the belt off the cassette.



Figure 15: Remove belt from cassette

Install the new belt onto the cassette and adjustable sheave (pulley). Re-install the outer half of the adjustable sheave by rotating it clockwise onto the threaded shaft. This process will be used to tighten the belt around the perimeter of the cassette. **Do not** tighten the belt onto the cassette until the beam assembly has been reinstalled.

Reverse the above procedures to re-assemble the cassette assembly. It will also be necessary to complete the steps in the previous sections that were used to install the cassette brush seal and the cassette.

Appendix A: Roofcurb Detail

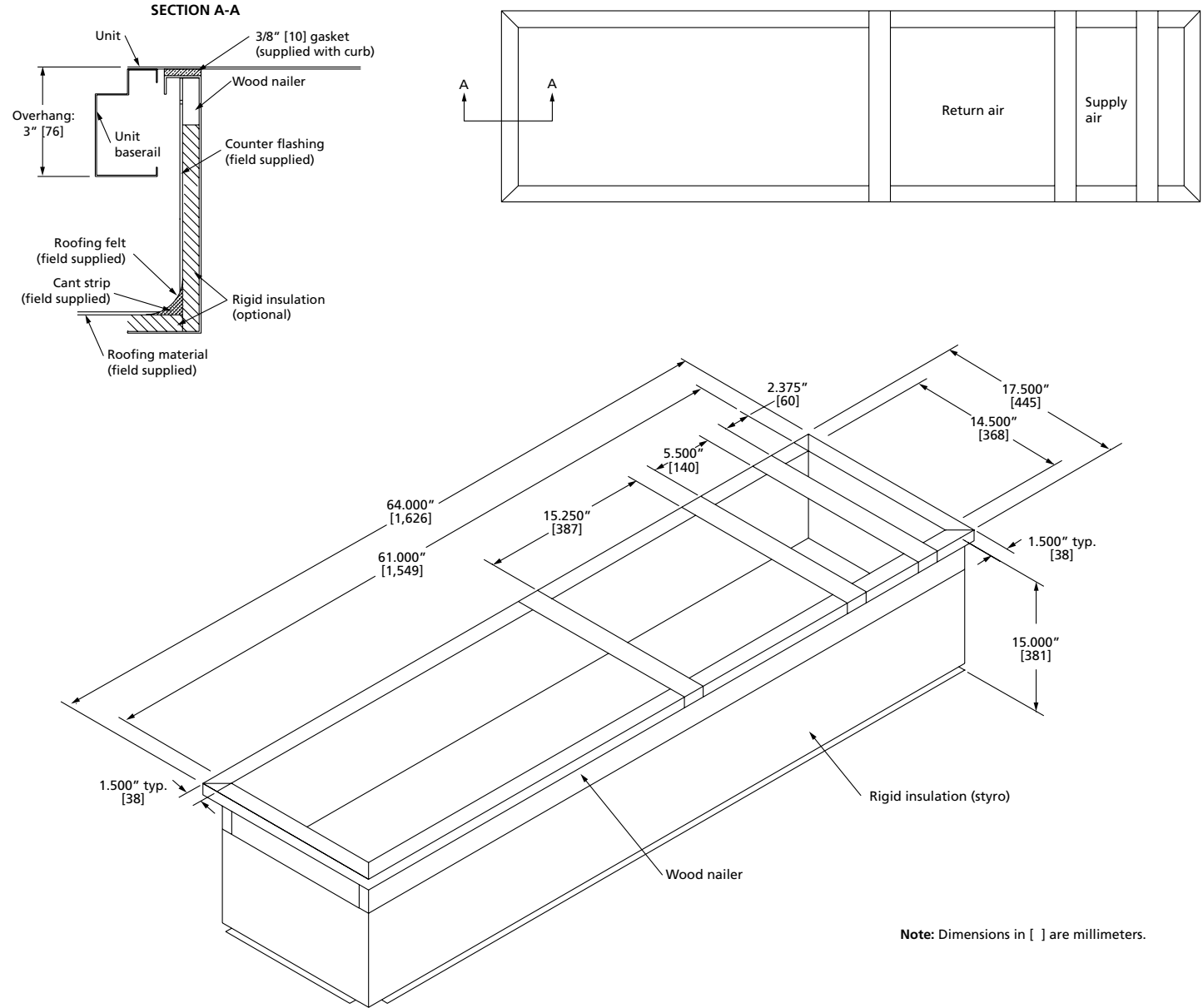


Figure A1: ERV500e roofcurb

Appendix B: Dimensional Drawing

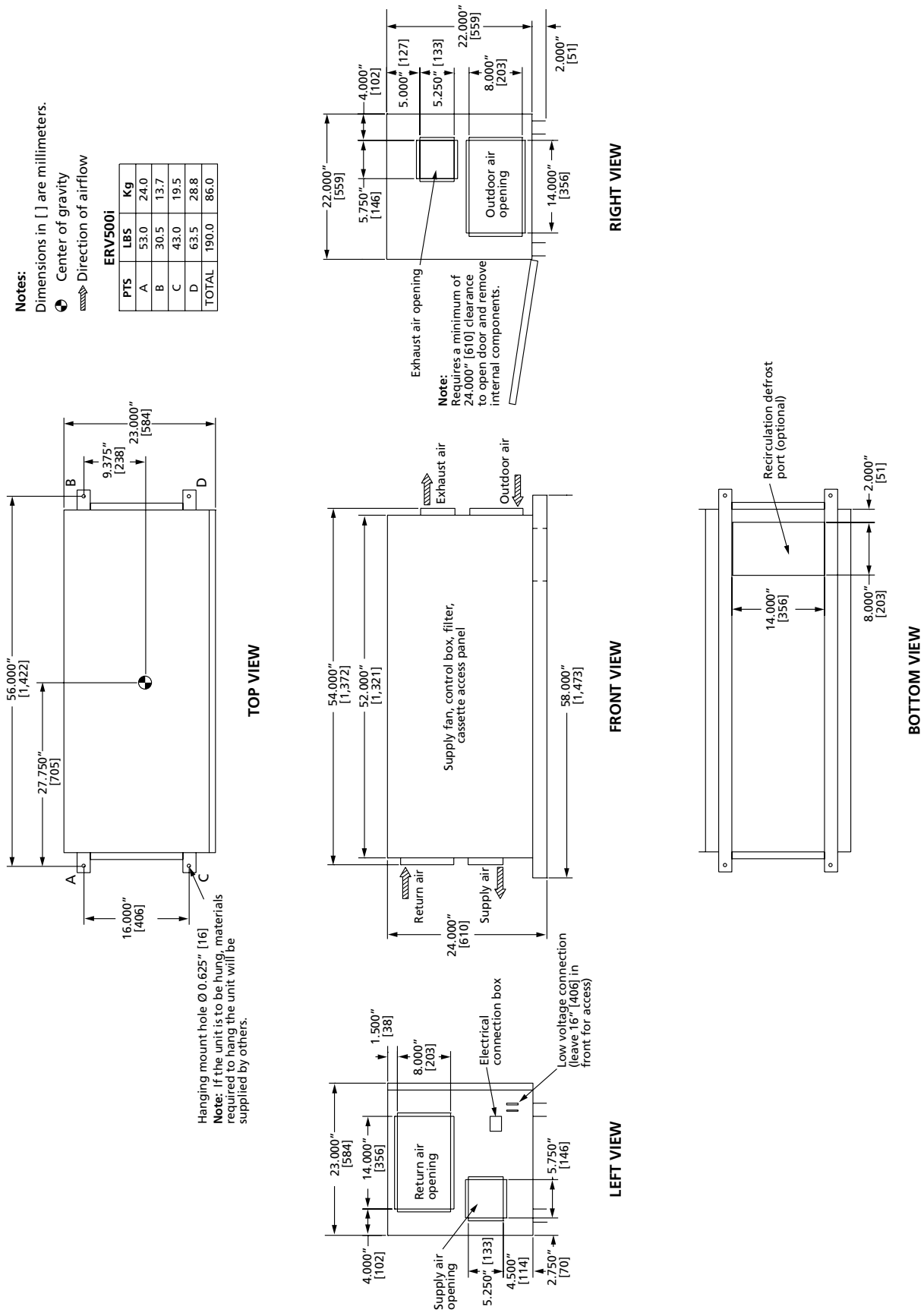


Figure B1: ERV500i unit dimensions

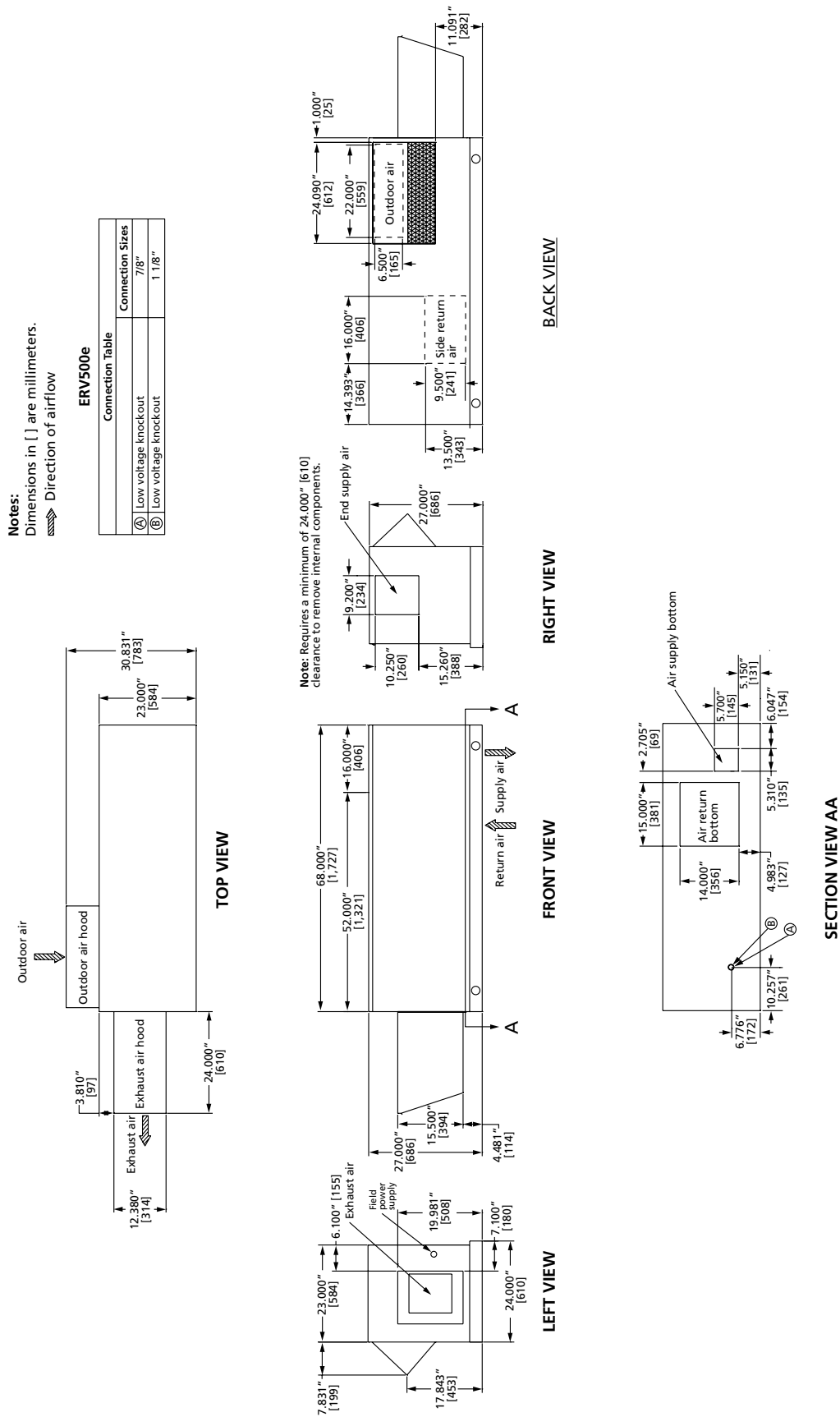


Figure B2: ERV500e unit dimensions

Appendix C: Hood Installation and Rigging

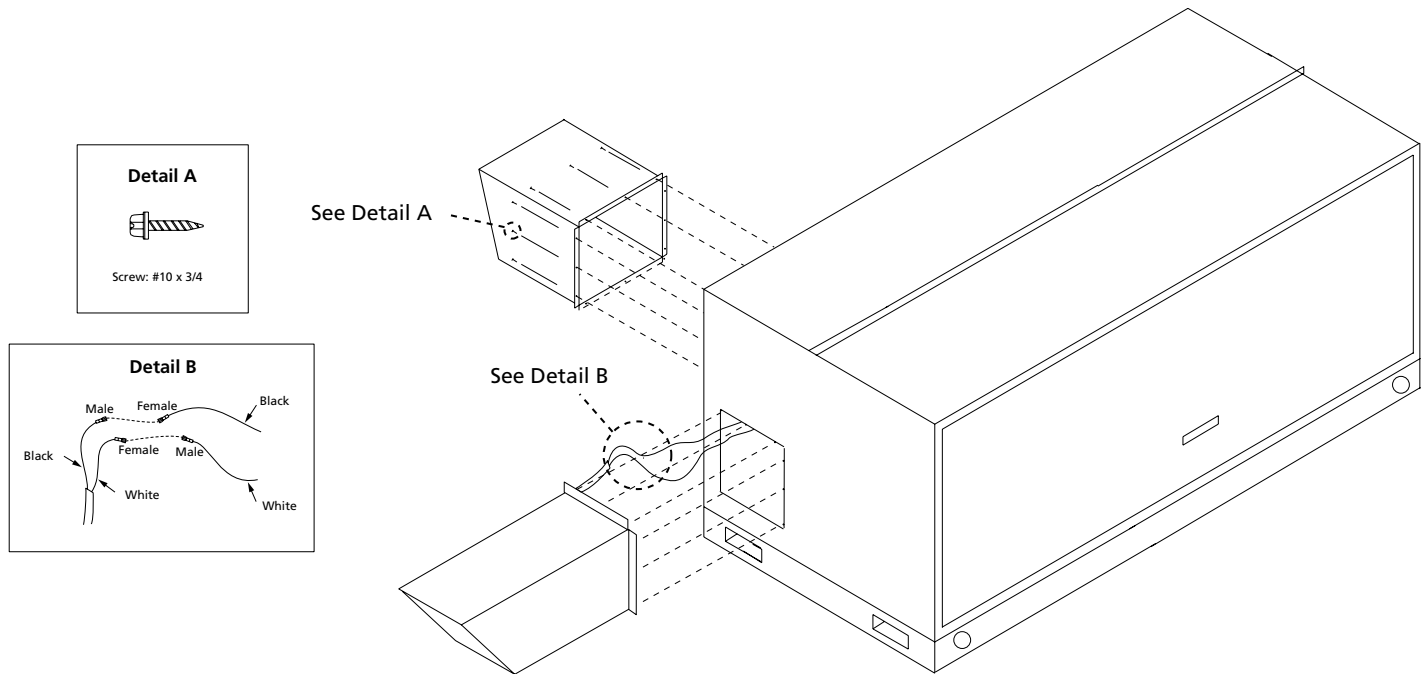


Figure C1: ERV500e hood installation

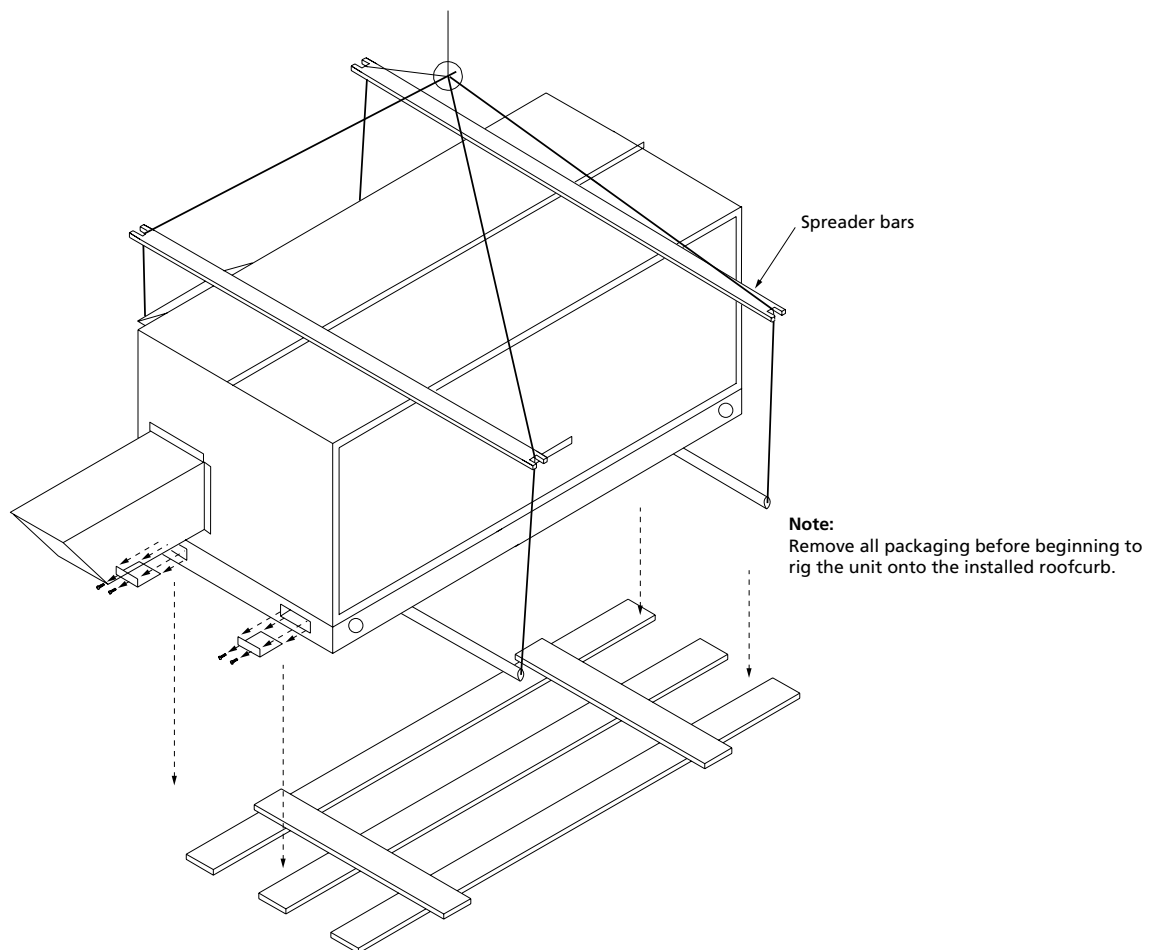


Figure C2: ERV500e rigging

Appendix D: Minimum Distance Requirements and Typical Installation

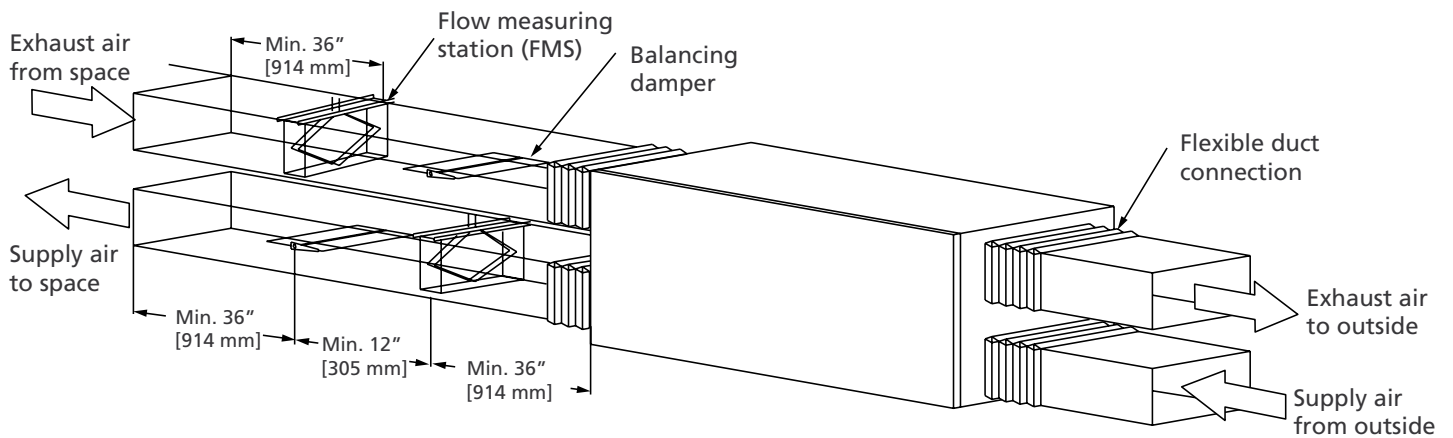


Figure D1: ERV500i minimum distance requirements

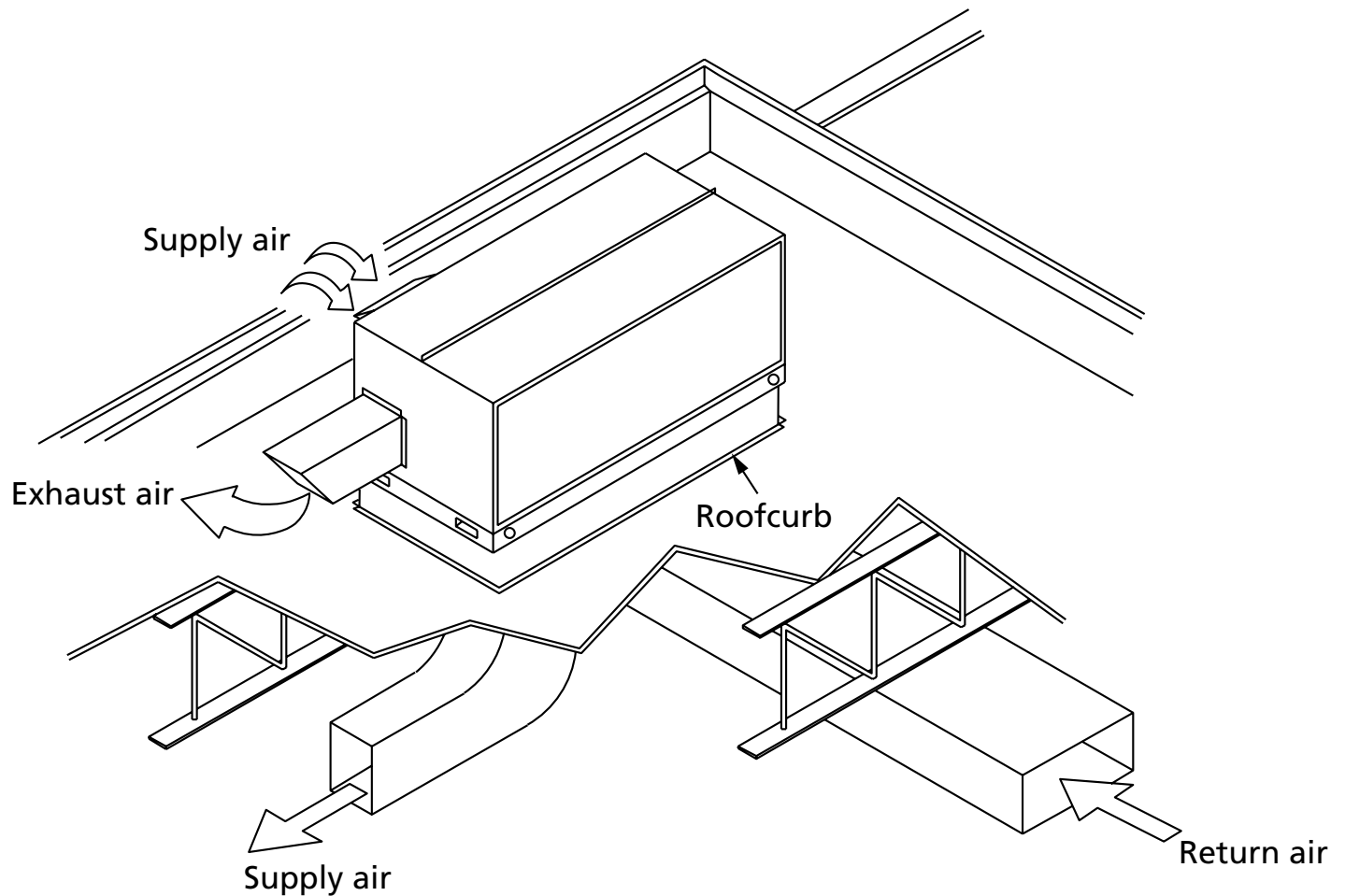
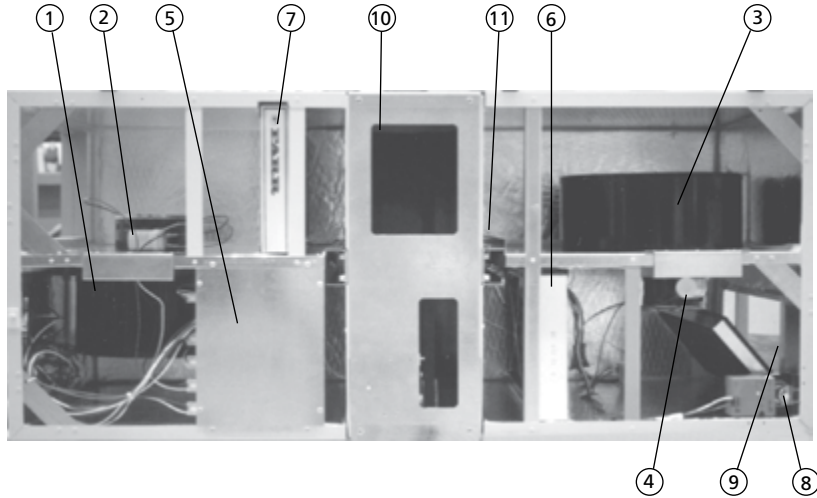


Figure D2: ERV500e typical installation

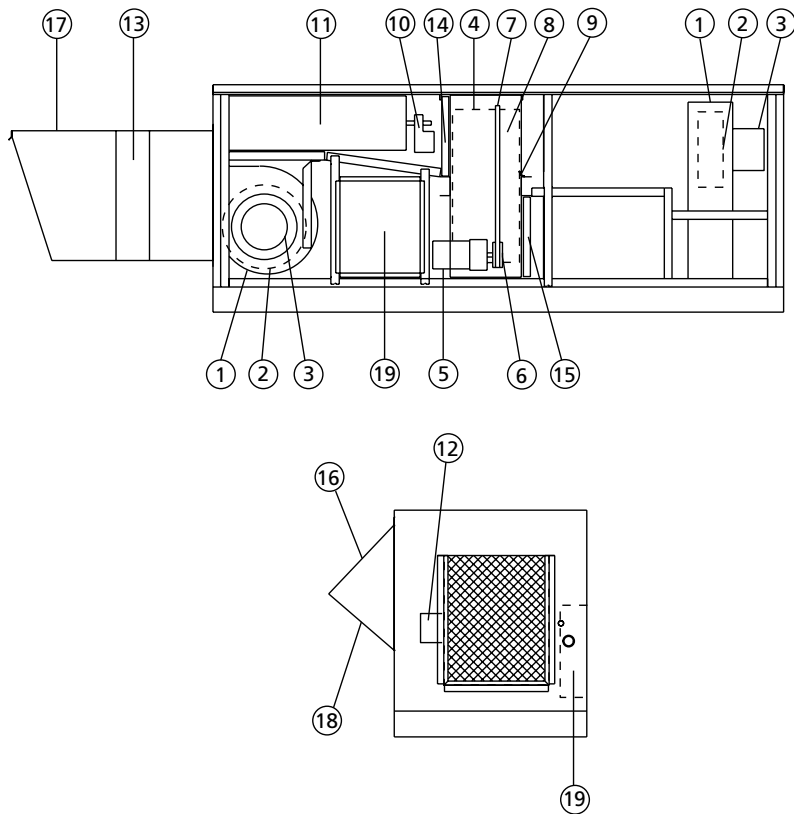
Appendix E: Components



Item	Description
1	Supply blower
2	Supply blower motor
3	Exhaust blower
4	Exhaust blower motor
5	Control box
6	Supply filter
7	Exhaust filter
8	Damper actuator
9	Intake damper
10	Enthalpy wheel
11	Wiper seal

Some unit components listed above are optional. Consult the unit nomenclature for standard and optional components.

Figure E1: ERV500i unit components



Item	Description
1	Housing
2	Fan
3	Fan motor
4	Enthalpy wheel
5	Wheel drive motor
6	Wheel drive pulley
7	Wheel drive belt
8	Wheel perimeter seal
9	Wheel wiper seal
10	Damper actuator
11	Damper intake
12	Exhaust damper actuator
13	Exhaust damper
14	MEF supply filter set (two per set)
15	MEF exhaust filter set (two per set)
16	Outdoor air intake hood
17	Exhaust air hood
18	Aluminum mesh prefilter
19	Control box

Some unit components listed above are optional. Consult the unit nomenclature for standard and optional components.

Figure E2: ERV500e unit components

Appendix F: Equipment Data

Table F1: ERV500 Equipment Data

	ERV500i	ERV500e
Rated airflow (CFM)	559 cfm @ 0.5" w.g.	507 cfm @ 0.50" w.g.
Shipping weight	320 lbs [145 kg]	320 lbs [145 kg]
Shipping dimensions (L x W x H)	57.5" x 24.75" x 24" [1,461 x 629 x 610 mm]	68" x 27" x 23" [1,727 x 686 x 584 mm]
Fans		
Impeller (forward centrifugal)	8.5" diameter x 3.5" width [216 mm diameter x 89 mm width]	8.5" diameter x 3.5" width [216 mm diameter x 89 mm width]
Motor	¼ HP supply and exhaust, two-speed on high	¼ HP supply, ¾ HP exhaust, single-speed
Supply and exhaust filters		
Quantity: 1 per airstream MEF	10" x 20" x 2" disposable [254 x 508 x 51 mm disposable]	10" x 20" x 1" disposable [254 x 508 x 25 mm disposable]

Appendix G: Terminal Control Diagrams

Wall Control Connection

Two types of remote wall controls are available:

1. Standard wall control with fan switch and dehumidistat control.
2. Xtra wall control with fan mode selection, dehumidistat control and maintenance indicator.

The remote wall controls work with the integrated electronic controls within the unit to control ventilation sequences. Each wall control above has different features and requires four-wire connection to the unit as shown below. Without the wall control, fans can be operated with dry contacts or a switch as in Figure G5.

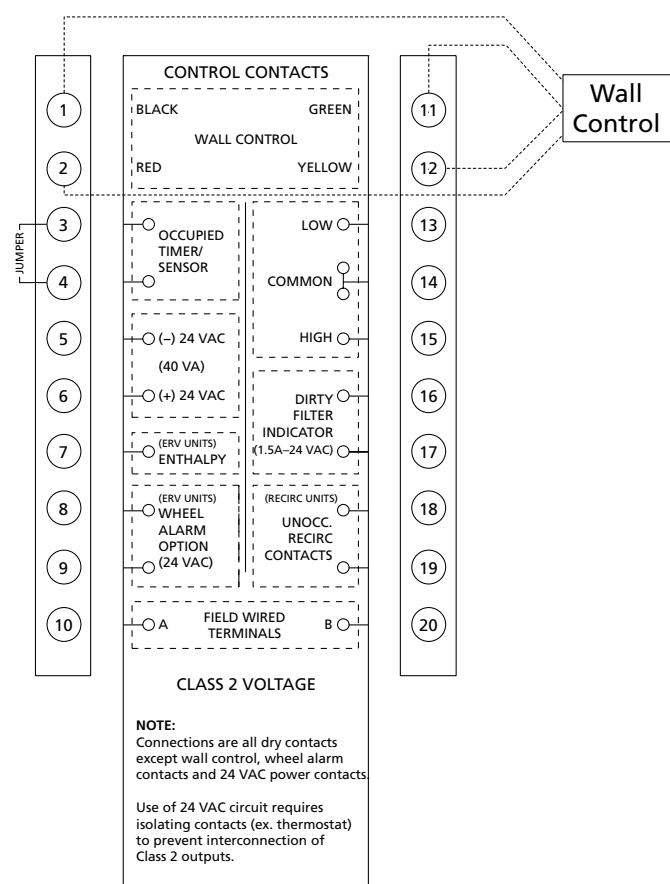


Figure G1: Wall control connection

IMPORTANT

All controls accessories (ex. night setback timer, CO₂ controller, enthalpy controller, smoke detector or wheel rotation sensor) intended to provide a contact closure for occupancy control across terminals 3 and 4 cannot be used in conjunction with the Xtra wall control.

If a wall control is required in addition to any of these options, only the standard wall control may be used. Without these options, a factory installed jumper across terminals 3 and 4 must be installed.

Occupied Timer/sensor Connection

Occupancy control is achieved by connection to the terminal interface shown below. These terminals require a dry contact which could be provided by a number of types of controls such as a timer, light sensor, occupancy sensor, Building Management System or other. The unit will not operate unless these contacts are closed!!

The drawing below shows a factory installed jumper and programmable timer option.

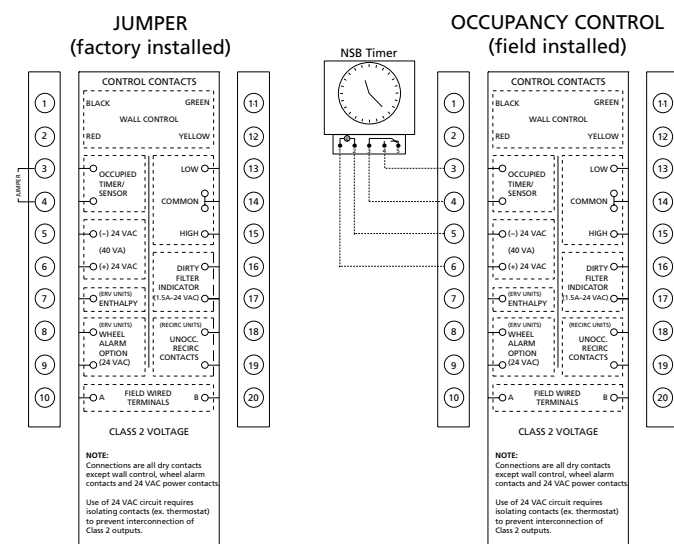


Figure G2: Occupied timer/sensor connection

IMPORTANT

All controls accessories (ex. night setback timer, CO₂ controller, enthalpy controller, smoke detector or wheel rotation sensor) intended to provide a contact closure for occupancy control across terminals 3 and 4 cannot be used in conjunction with the Xtra wall control.

If a wall control is required in addition to any of these options, only the standard wall control may be used. Without these options, a factory installed jumper across terminals 3 and 4 must be installed.

Enthalpy Control

Energy Recovery Ventilators (ERVs) can be controlled by an enthalpy controller that switches between free cooling and AC unit cooling. When free cooling is possible, the ERV will ventilate without energy recovery (the enthalpy wheel stops) on a call for cooling. The ventilation rate is not affected. If the unit is not operating, enthalpy control contact will initiate low speed ventilation. The enthalpy control must be connected in conjunction with a cooling thermostat control to prevent free cooling from initiating in heating seasons as shown below.

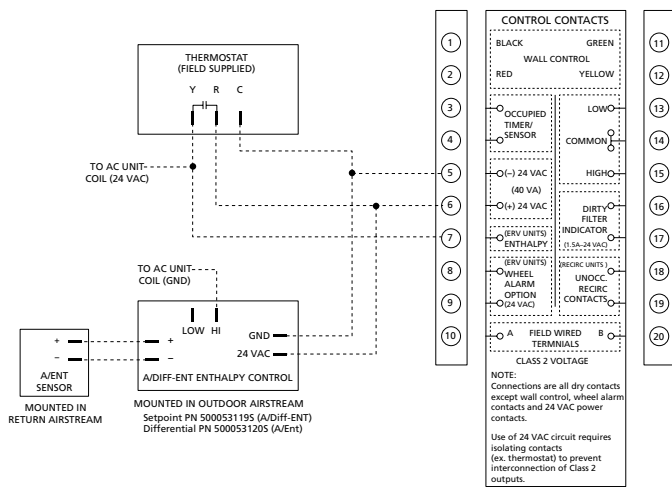


Figure G3: Setpoint/differential enthalpy control

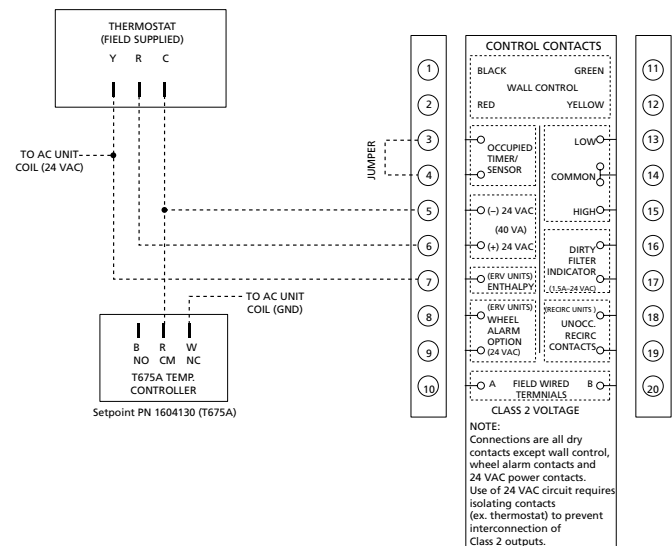


Figure G4: Thermostat (dry bulb) control

Remote Fan Control

Remote fan control can be achieved by connecting dry contact controls to the terminal interface at terminals labeled: Low-Com-High (not all units have two speeds). Placing a jumper across the Low and Com terminals will put the unit in low speed ventilation or placing a jumper across the High and Com terminals will put the unit into high speed. **Do not** jumper all three terminals together. These controls could also be the following: SPDT switch, dehumidistat, CO₂ sensor, light sensor, heat sensor, timer, Building Management System, etc. Figure G5 represents a switch connected to the unit.

CAUTION

Do not use a wall control and remote fan switch at the same time. Damage to the unit may occur.

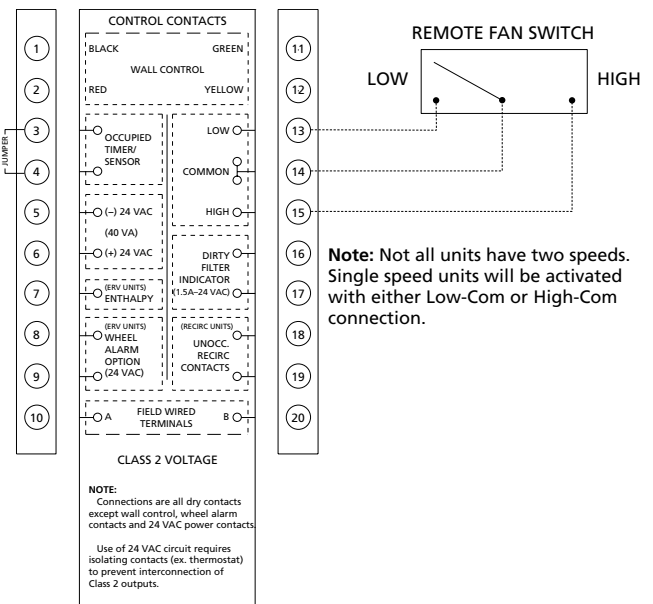


Figure G5: Remote fan control

Low Temperature Control

The fans of the ERV can be controlled using a setpoint low temperature controller. If the supply air discharge temperature falls below the setpoint on the low temperature controller, the contacts between R-W break, therefore, de-energizing the fans and closing the outside air damper.

IMPORTANT

An Xtra wall control cannot be used with a low temperature control.

The remote bulb sensor must be placed downstream of the supply air fan discharge.

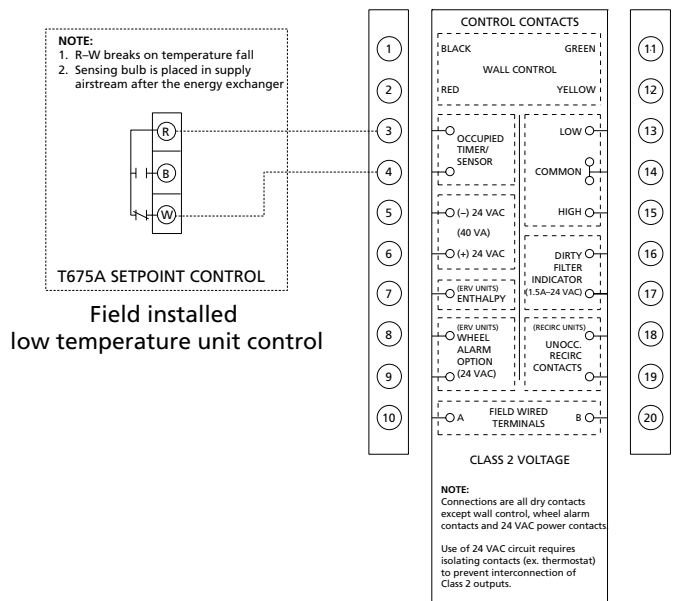


Figure G6: Low temperature control

Wheel Rotation Sensor

ERVs can be equipped with a wheel rotation sensor option. This option cannot be ordered for a non-defrost unit. This option cannot be used in conjunction with a digital wall control and must be ordered with a control board. With the wheel rotating, the wheel rotation sensor board activates the relay coil and closes the 'NO' (normally open) set of contacts across the occupied/timer sensor contacts (pin 3 and 4), allowing the unit to operate. If the wheel rotation stops (unless in an enthalpy state, defrost mode or unoccupied condition), the contacts will be open and cause the motors to shut down and the dampers (optional) to close.

IMPORTANT

If the wheel rotation sensor board shuts the unit down, the only procedure to re-start the unit is to turn the power off and then back on again.

A set of 24 VAC wheel alarm contacts are available on the terminals to power a light or indicator. The drawing below shows the wiring necessary to power the 24 VAC light or indicator.

CAUTION

The wheel rotation sensor printed circuit board has 120 VAC wired to two terminals. Improper wiring or handling of the circuit board could either damage the board, the unit or cause personal injury.

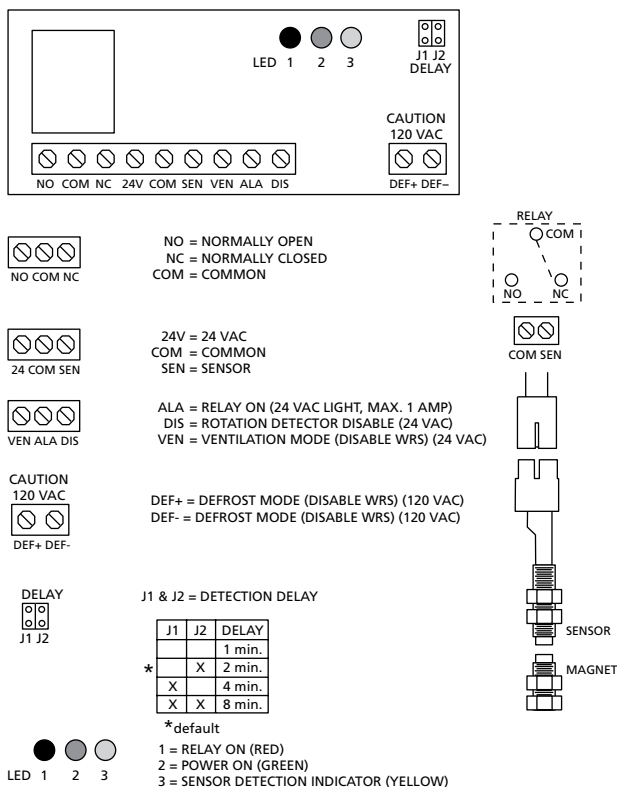


Figure G7: Wheel rotation sensor board

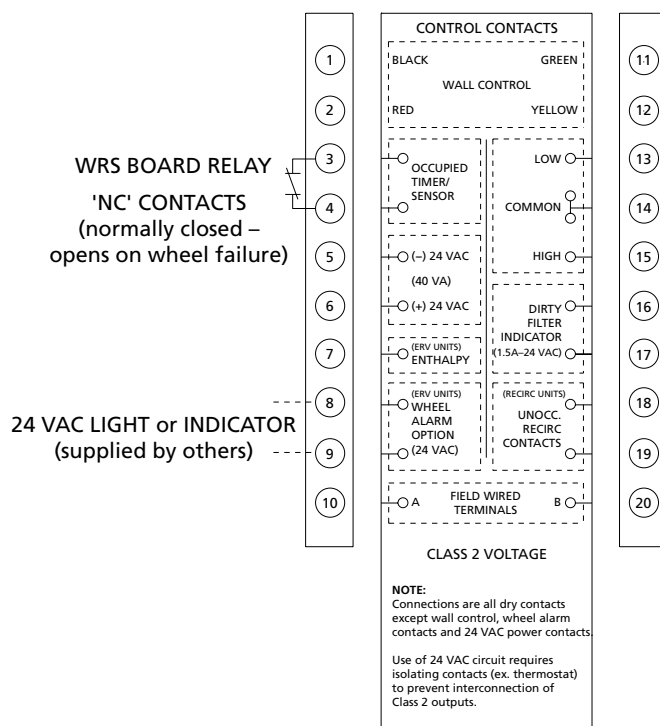


Figure G8: Wheel rotation alarm

CO₂ Ventilation Control

ERVs can be controlled by a CO₂ controller that can be connected to fan control Low-Com-High (not all units have two speeds). As the CO₂ levels exceed acceptable limits, the dry contact across High-Com is closed, raising high speed fan ventilation.

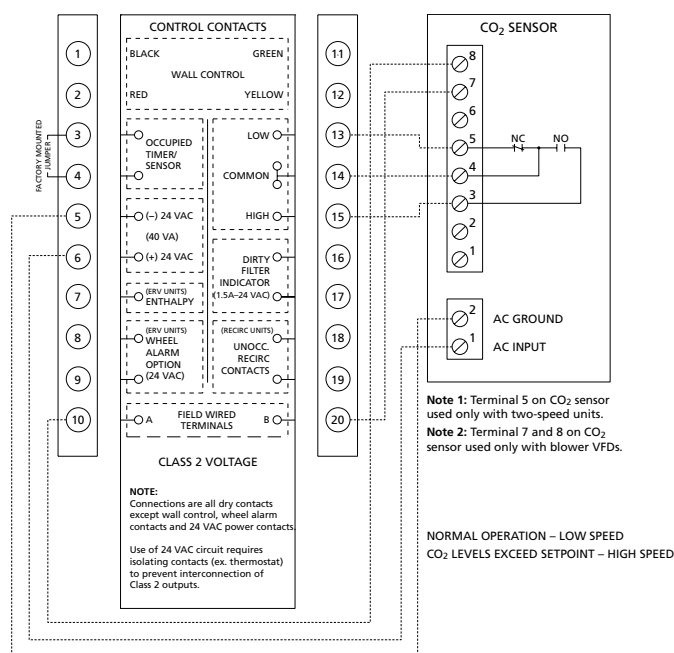


Figure G9: CO₂ ventilation control

Unoccupied Recirc Contacts (ERV500i only)

On recirc defrost units, an unoccupied recirc control can be achieved by connection to the terminal interface shown below. These terminals require a 24 VAC signal which could be provided by a timer, thermostat or other. Closure of these terminals will cause the unit to go into a recirc mode where the supply fan runs on high speed and the exhaust fan stops.

IMPORTANT

Although these contacts are intended for use during unoccupied periods, they are still active during an occupied condition. Therefore, the 24 VAC signal should be applied such that it is disabled during occupied periods, preventing the unit from going into a recirc condition unnecessarily.

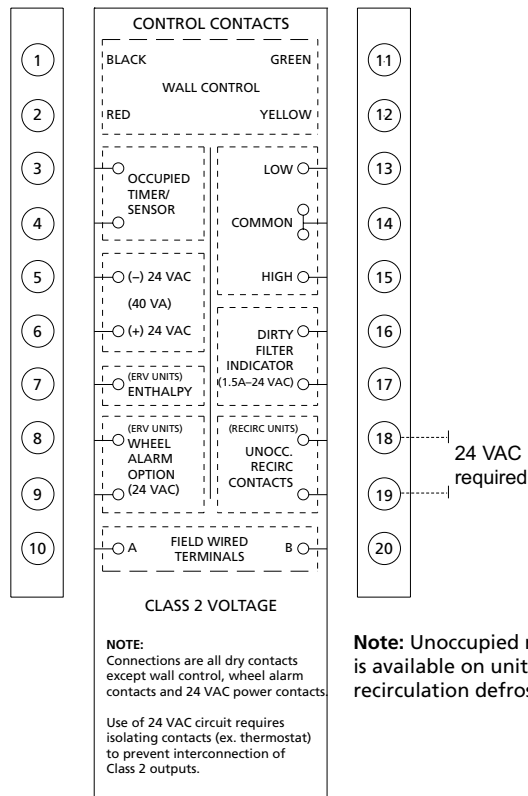


Figure G10: Unoccupied recirc contacts

Smoke Detector

Locate in a normally occupied area of premises. Recommended for compliance to NFPA-90A and IMC code 606.

ERVs can be equipped with a duct mount smoke detector which will monitor the air when passing through the duct system into the ERV. When sufficient smoke is detected,

an alarm condition is activated. By connecting the occupied timer/sensor contacts to the NC alarm auxiliary contacts on the duct sensor, an alarm condition will open the auxiliary contact and stop operation of the ERV.

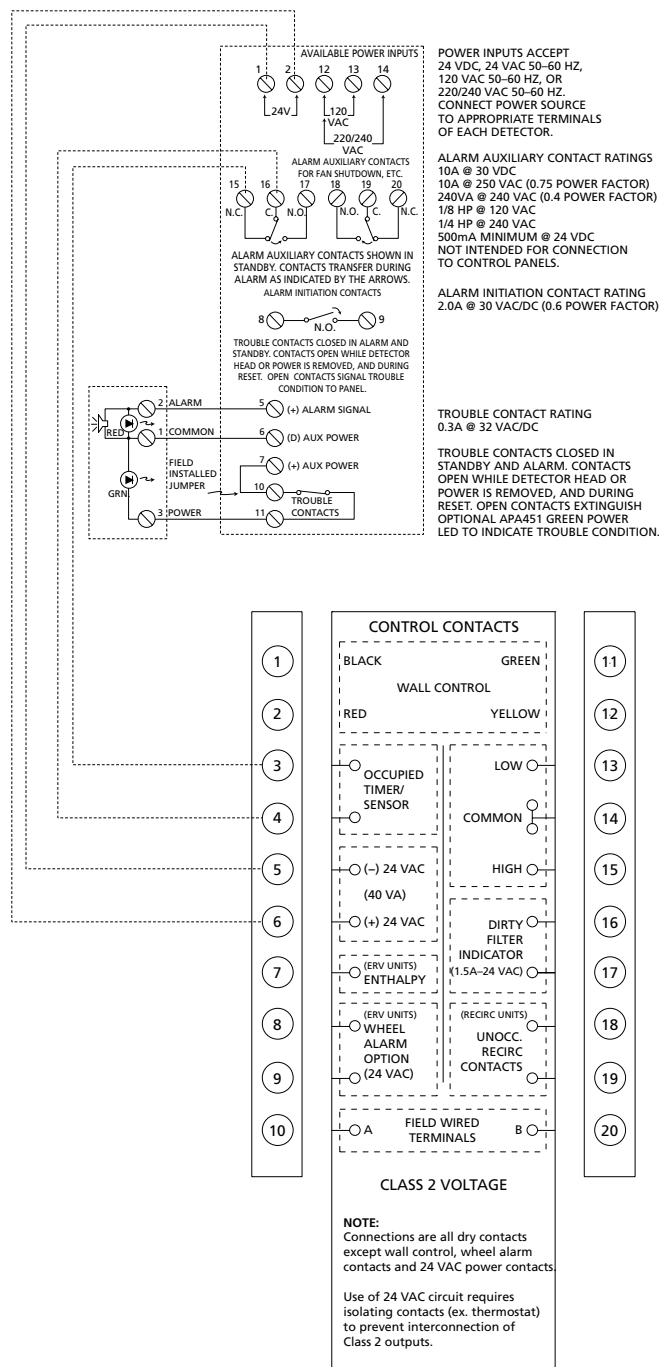


Figure G11: Smoke detector

Appendix H: Troubleshooting

Table H1: ERV500i/e Troubleshooting

Problem	Cause	Solution
Unit will not turn on.	External wiring not connected.	Check external wiring.
	Internal wiring not making contact.	Check the wiring in the control box.
	Occupied/unoccupied control circuit is open.	Close circuit.
Unit will not turn off.	External terminal strip wiring.	Check if high or low speed control contacts are closed on the terminal strip.
Air from supply diffusers too cold.	Imbalance of supply and exhaust air.	Check filters and enthalpy wheel for blockage. Check balance of airflow. Install post heat module.
Unit makes an annoying noise.	Blower wheel out of alignment.	Remove the motor/blower assembly. Adjust blower wheel.
	Enthalpy wheel brush seal not functioning properly.	Check for proper seal operation.
Enthalpy wheel not running.	Electrical supply interrupted.	Check unit circuit breaker. Check two-wire service connector on motor.
	Drive motor capacitor.	Check capacitor connections. Check motor operation with new capacitor.
	Drive motor failure.	Check the drive motor.
	Drive motor relay in control box.	Check relay wiring. Check relay operation.
	Drive belt.	Check for drive belt derailment off of drive pulley or failure.
	Drive pulley.	Check for securely fastened pulley on motor shaft.
	Free cooling contact closed.	Open contact on external terminal block of unit.
Motor and blower not functioning.	Electrical supply interrupted.	Check unit circuit breaker. Check three-wire service connector on each motor.
	Fan motor capacitor.	Check capacitor connections. Check motor operation with a new capacitor.
	Fan motor failure.	Check fan motor.
	Fan motor relay in control box.	Check relay wiring. Check relay operation.



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